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(54) Machine for filling containers with a food product.

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Description

This invention relates to a machine for filling containers with a food product and also to a method of filling containers with a food product.

A known machine for filling containers with a food product comprises a conveyor which carries the containers along a horizontal path, a loading station for loading containers onto the conveyor, a filling station for filling the containers with a food product, a gassing station for creating an atmosphere of a desired gas in the unfilled parts of the containers, a sealing station for applying closures to the containers, and an unloading station for unloading the containers from the conveyor. Such a filling machine may include a sterilising station and a drying station located between the loading station and the filling station.

One reason for creating an atmosphere of a desired gas in the unfilled parts of the containers is to achieve a low level of oxygen in the sealed containers. Food products having a relatively high acidity, for example fruit juice or tomato juice, are prone to deteriorate during storage due to microbiological action if the oxygen content is not reduced to a low level. The gas which is normally used for reducing the oxygen content is nitrogen.

In a known filling machine, the gassing station comprises a chamber located above the conveyor and the desired gas is introduced through a slot in the wall of this chamber. When the gas is introduced in this manner, it enters the chamber in a state of turbulent flow, thereby causing air to be drawn into the chamber from surrounding parts of the machine. With this known arrangement, when the desired gas is nitrogen it is not possible to reduce the oxygen content to below about 6% by volume. In the case of a food product having a relatively high acidity, 6% is an unacceptably high level for the oxygen content.

A known machine for filling containers with a food product is the ML-4 Freshfill which is supplied by Genesis Packaging Systems of Pittsburgh, Pennsylvania, USA.

This machine includes a machine for filling containers with a food product, the machine including

a conveyor for carrying containers along a substantially horizontal path;

a loading station for loading empty containers onto the conveyor;

a filling station for filling the containers with a food product;

a sealing station for applying closures for sealing the filled containers; and

an unloading station for unloading the filled and sealed containers from the conveyor;

the stations being arranged along the horizontal path in the order recited;

the machine further including a set of rollers for guiding sealing foil along a guide path to the sealing station, the rollers including one roller located above the conveyor and upstream, in the direction of movement of the conveyor, from the sealing station, the guide path including a downward strech leading to the one roller, the sealing foil passing along the downward stretch. This machine is discussed further below

A sterile packing machine is known from EP-A-0243003 which employs a plurality of nozzles to direct hydrogen peroxide, and subsequently, drying air to vessels prior to filling with a foodstuff and sealing by a cap.

A machine for sealing glass containers is disclosed in US-A-2869301, in which, at a filling station, steam is applied via a tube provided with a plurality of orifices immediately prior to sealing, to obtain a vacuum.

It is an object of the invention to provide a new and improved machine for filling containers with a food product and it is another object of this invention to provide a new and improved method for filling containers with a food product.

According to one aspect of this invention, there is provided a machine or for filling containers with a food product, the machine including

a conveyor for carrying containers along a substantially horizontal path;

a loading station for loading empty containers onto the conveyor;

a filling station for filling the containers with a food product;

a gassing station for creating an atmosphere of a desired gas in the unfilled parts of the containers prior to sealing;

a sealing station for applying closures for sealing the filled containers; and

an unloading station for unloading the filled and sealed containers from the conveyor;

the stations being arranged along the horizontal path in the order recited;

the gassing station comprising a gassing chamber located above the conveyor between the filling and sealing stations and an injection tube of a porous structure formed from a sintered metal located in the gassing chamber for injecting the desired gas through the pores of the injection tube into the gassing chamber in a state of laminar flow;

the machine further including a set of rollers for guiding sealing foil along a guide path to the sealing station, the rollers including one roller located above the conveyor and upstream, in the direction of movement of the conveyor, from the sealing station, the guide path including a downward stretch leading to the one roller, the sealing foil passing along the downward stretch forming a wall of the gassing chamber; and

the gassing chamber having an upper surface which approaches the downward stretch of the guide

path at a position which is above or at the level of the axis of the one roller.

By ensuring that the desired gas enters the chamber of the gassing station in a state of laminar flow, the tendency for air to be drawn into the chamber from surrounding parts of the machine is substanially avoided. With the filling machine of this invention, where the desired gas is nitrogen, it is possible to reduce the oxygen content in the unfilled parts of the containers, after sealing, to below 2%.

According to another aspect of this invention, there is provided a method of filling containers with a food product comprising the steps of moving a conveyor along a substantially horizontal path, loading empty containers onto the conveyor at a loading station, filling the containers with a food product at a filling station, creating, prior to sealing, an atmosphere of a desired gas in the unfilled parts of the containers at a gassing station, applying closures to the containers at a sealing station, and unloading the containers from the conveyor at an unloading station, the stations being arranged along the horizontal path in the order recited, in which, in the step of creating an atmosphere of a desired gas in the unfilled parts of the containers, the desired gas is injected by means of a porous injection tube into a chamber located above the conveyor between the filling and sealing stations in a state of laminar flow through the pores in the injection tube which is formed from a sintered metal, the method further including the step of guiding sealing foil along a guide path to the sealing station with the aid of a set of rollers, the rollers including one roller located along the conveyor and upstream, in the direction of movement of the conveyor, from the sealing station, the guide path including a downward stretch leading to the one roller and the sealing foil passing along the downward stretch forming a wall of the chamber of the gassing station in which the upper surface of the wall of the gassing station approaches the downward stretch of the guide path at a position which is above or at the axis of rotation of the one roller.

This invention will now be described in more detail, by way of example, with reference to the drawings in which:

Figure 1 is a block diagram of a filling machine embodying this invention;

Figure 2 is a greatly simplified elevational view, partly in cross-section, of the filling machine of Figure 1;

Figure 3 is an elevational view, partly in cross-section, of the gassing station and sealing stations of the filling machine of Figure 1;

Figure 4 is a cross-sectional view of an injection tube forming part of the gassing station;

Figure 5 is a circuit diagram of a sterilising arrangement for the gassing station;

Figure 6 is an elevational view of an alternative gassing station for the filling machine of Figure 1;

Figure 7 is an elevational view of another alternative gassing station for the filling machine of figure 1; and

Figure 8 is an elevational view of experimental gassing station which produced unsatisfactory results.

Referring now to Figure 1, there is shown a block diagram of a filling machine embodying this invention. Although not shown in Figure 1, the filling machine includes a conveyor and this conveyor passes, in turn, a loading station 10, a sterilising station 12, a drying station 14, a filling station 16, a gassing station 18, a sealing station 20, and an unloading station 22. At the loading station 10 containers are loaded onto the conveyor. At the sterilising station 12, a small quantity of hydrogen peroxide from a supply tank 24 is injected into each container. At the drying station 14, the containers are dried with heated air. At the filling station 16, the containers receive food from a supply vessel 26. At the gassing station 18, the containers pass through a chamber which receives nitrogen from a nitrogen cylinder 28. At the sealing station 20, the containers are sealed with closures which are cut out from foil received from a reel 30. In the present example, the sealing foil is formed from aluminium sheet but other materials are also suitable. At the unloading station 22, the containers are unloaded from the conveyor.

Some of the mechanical details of the filling machine will now be described with reference to Figure 2.

The conveyor comprises a series of slats, some of which are indicated by reference numeral 40. Although not shown in Figure 2, the slats 40 are pivotally connected together so as to form an endless loop and this endless loop passes around both guide and feed rollers. The endless loop is moved in an indexing mode so as to ensure that the containers have an adequate dwell time at each station. In the present example, the containers take the form of conical cups, some of which are indicate by reference numeral 42. In order to carry these conical cups 42, each slat 40 has row of circular apertures. In the present example, the machine has four lanes and so each slat 40 has a row of four circular apertures.

At the loading station 10, the cups 42 are dispensed onto the conveyor from a row of four feed tubes, one of which is shown and indicated by reference numeral 44. At the sterilising station 12, hydrogen peroxide is injected into the cups 42 from a row of four nozzles, one of which is shown and indicated by reference numeral 46. The nozzles 46 receive hydrogen peroxide from a supply tube 48.

The drying station 14 has a casing 50 which defines both an upper chamber 52, which receives filtered air, and a drying chamber 54. A set of passages 56 lead from the upper chamber 52 to the drying

chamber 54 and each of these passages 56 contains an electric heating coil 58 for heating the air. In the drying chamber 54, the heated air serves both to activate the sterilising action of the hydrogen peroxide and to dry the cups 42.

The filling station 16 and the gassing station 18 share a common solid casing member 70 which defines both a filling chamber 72 and a gassing chamber 74. The filling chamber 72 receives filtered air from a tube 76 formed from sintered stainless steel. The air is filtered by a filter which can be sterilized by steam. A row of four filling nozzles, one of which is shown and indicated by reference numeral 78, is mounted on the casing member 70 so as to inject the food product into the cups 42. The filling nozzles 78 receive the food product from a supply tube 80. The food product may be, for example, fruit juice or tomato juice. As will be described in more detail, nitogren is introduced into the gassing chamber 74 by an injection tube 82.

Sealing foil 84 is guided along a guide path by a set of rollers, two of which are shown and indicated, respectively, by reference numerals 86 and 88. The sealing foil 84 passes through a duct 90. The duct 90 receives heated air from a heater 92 which, in turn, receives filtered air from a duct 94. As the foil 94 passes throught the duct 90, it is heated in preparation for the sealing operation at the sealing station 20.

With the exception of the details of the gas station 18 and the provision of the injection tube 76 formed from sintered steel in the filling station 16; the individual parts of the filling machine shown in Figures 1 and 2 are of a conventional design. An example of a filling machine having these conventional parts is the ML-4 Freshfill filling machine supplied by Genesis Packaging Systems, Foster Plaza VII, 661 Andersen Drive, Pittsburgh, Pennsylvania, USA.

The gassing station 16 and the sealing station 20 will now be described in greater detail with reference to Figure 3.

The sealing station 20 has a row of four sealing heads, one of which is shown and indicated by reference numeral 100. The sealing head 100 has a mounting plate 102, a circular cutter 104, a sealing member 106, and a heating coil 108 for the sealing member 106. In operation, with one of the cups 42 stationary below the sealing head 100, the sealing member 106 is moved downwardly so as to heat seal the foil 84 onto the cup 42. The cutter 104 is then moved downwardly to cut a circular closure from the foil 84.

Immediately before the roller 88, the guide path for the foil 84 has a downward stretch 110 and, as the foil passes along this downard stretch, it forms a wall of the chamber 74 of the gassing station 18.

As noted previously, the gassing station 18 comprises an injection tube 82 located in a gassing chamber 74. The upper surface 112 of the gassing chamber 74 is defined by the casing member 70. As may be seen, this upper surface 112 is above the level of the axis of rotation 114 of roller 88. The sintered stainless steel, from which the injection tube is formed, is of a porous structure and its pores form holes for injecting the nitrogen into the chamber 74. As shown in Figure 4, the injection tube 82 is mounted between a connector member 116 and a plug 118, both of which are mounted on the casing member 70.

In operation, nitrogen is injected into chamber 74 by injection tube 82. Because the pores of tube 82 are small, the nitrogen enters the chamber 74 in a state of laminar flow. Because the gas enters chamber 74 in a state of laminar rather than turbulent flow, it does not entrain air from surrounding parts of the machine. Any tendency for the nitrogen to entrain air from surrounding parts of the filling machine is also avoided by positioning the upper surface of 112 of chamber 74 above the rotational axis 114 of roller 88. As the cups 42 pass through the filling station 18, an atmosphere of nitrogen is created in their unfilled parts to the almost complete exclusion of oxygen. With the arrangement shown in Figure 3, it has been found that the oxygen content in the unfilled parts of the sealed containers is less than 2% by volume.

By way of an alternative, the nitrogen could also be injected through injection holes formed in the casing member 70. It is essential that the injection holes are small enough to ensure that the nitrogen gas enters the chamber 74 in the state of laminar flow.

Before a filling operation, the various parts of the filling machine described above have to be sterilised. With the exception of the gassing station, such sterilisation is performed in a conventional manner. In the case of the gassing station 18, a circuit diagram for the sterilising arrangement is shown in Figure 5. This sterilisation arrangement comprises an air compressor 130, a filter 132, a heater 134 for heating the air to a temperature in the range of 110 °C to 120 °C, and a venturi 136 leading to the injection tube 82. The throat of venturi 136 is connected by a tube 138 to a reservoir 40 containing hydrogen peroxide. In order to perform a sterilization operation, the supply of gas from the nitrogen cylinder 28 is shut off. The compressor 130 and the heater 134 are turned on with the result that a mixture of heated air and hydrogen peroxide are injected into the gassing chamber 74, thereby sterilising the walls of this chamber.

Referring now to Figure 6 there is shown an alternative arrangement for the gassing station of the filling machine shown in Figures 1 to 4. The arrangement shown in Figure 6 is generally similar to that shown in Figure 3 and like parts are denoted by the same reference numerals preceded by numeral "6". In the arrangement shown in Figure 6, the upper surface 6112 of the gassing chamber 674 extends upwardly, with respect to the direction of movement of the conveyor. This upper surface 6112 approaches

the downward stretch 6110 of the guide path for foil 684 at a position above the level of the rotational axis of roller 688.

Referring now to Figure 7, there is shown a sketch of another arrangement for the gassing station for the filling machine of Figures 1 to 4. This further arrangement is also generally similar to the arrangement shown in Figure 3 and like parts are denoted by the same reference numerals but preceded by numeral "7". In the arrangement shown in Figure 7, the upper surface 7112 of the gassing chamber 774 extends horizontally at the level of the axis of rotation of the roller 788. The gassing chamber 774 has a lower wall 7113 which has an opening 7115 at its upstream end.

In trial tests, it has been found that the level of the oxygen content in sealed containers is slightly higher in the arrangements shown in Figures 6 and 7 than in the arrangement shown in Figure 3. However, levels below 2% can be achieved in the arrangement of Figure 6 or the arrangement of Figure 7 and so both of these arrangements are satisfactory.

Referring now to Figure 8, there is shown an arrangement for a gassing chamber which has proved to be unsatisfactory. In Figure 8, parts which are similar to the parts shown in Figure 3 are indicated by the same reference numerals but preceded by numeral "8". In the arrangement of Figure 8, the upper surface 8112 of the gassing chamber 874 extends horizontally and then downwardly, in relation to the direction to the movement of the conveyor, and terminates immediately below the axis of rotation of roller 888. The gassing chamber 874 has a lower wall which extends continuously from the outlet of the filling chamber 872 and terminates below the axis of rotation of roller 888. With this arrangement the velocity of the nitrogen increases as it flows into the restriction formed between the upper surface 8112 and the lower wall 8113. The consequent drop in pressure causes air to be entrained from surrounding parts of the machine along the paths indicated by arrows A. Because of this entrainment of air, low levels for the oxygen content in the sealed containers cannot be achieved.

In the filling machine described above, nitrogen is supplied to the gassing chamber for the purpose of achieving a low level for the oxygen content in the sealed containers. In view of its natural abundancy, nitrogen represents the natural choice for this purpose, but, if desired, another gas may be used in its place. Also, although the arrangements shown in Figures 3,6 and 7 have been described with reference to creating an atmopshere of nitrogen so as to reduce the oxygen content, these arrangements are suitable for creating an atmosphere of a particular gas for a different purpose, within the scope of the appended claims.

Claims

1. A machine for filling containers with a food product, the machine including

a conveyor (40) for carrying containers along a substantially horizontal path;

a loading station (10) for loading empty containers (42) onto the conveyor;

a filling station (16) for filling the containers with a food product;

a gassing station (18) for creating an atmosphere of a desired gas in the unfilled parts of the containers prior to sealing;

a sealing station (20) for applying closures for sealing the filled containers; and

an unloading station (22) for unloading the filled and sealed containers from the conveyor;

the stations being arranged along the horizontal path in the order recited;

the gassing station (18) comprising a gassing chamber (74) located above the conveyor between the filling and sealing stations (16,20) and an injection tube (82) of a porous structure formed from a sintered metal located in the gassing chamber (74) for injecting the desired gas through the pores of the injection tube (82) into the gassing chamber (74) in a state of laminar flow;

the machine further including a set of rollers (86,88) for guiding sealing foil (84) along a guide path to the sealing station (20), the rollers including one roller (88) located above the conveyor and upstream, in the direction of movement of the conveyor, from the sealing station (20), the guide path including a downward stretch (110) leading to the one roller (88), the sealing foil passing along the downward stretch (110) forming a wall of the gassing chamber (74); and

the gassing chamber (74) having an upper surface (112) which approaches the downward stretch (110) of the guide path at a position which is above or at the level of the axis (114) of the one roller (88).

2. A filling machine as claimed in claim 1, in which the injection tube (82) is formed from sintered steel.

3. A filling machine as claimed in claim 1 or claim 2, in which the desired gas is nitrogen.

4. A filling machine as claimed in any preceding claim, further including a sterilising station (12) having means (46) for injecting hydrogen peroxide into the empty containers, and a drying station (14) having means (54) for injecting filtered heated air into the containers for activating the sterilising action of the hydrogen peroxide and

drying the containers prior to entering the filling station (16).

5. A filling machine as claimed in claim 4, in which the sterilising station (12) and the drying station (14) are located between the loading station (10) and the filling station (16).

6. A filling machine, as claimed in any preceding claim, in which the filling station (16) includes a further injection tube (76) formed from a sintered metal for injecting filtered air filtered by a filter sterilised by steam into the filling chamber (72).

7. A filling machine, according to claim 2 or claim 6, in which the injection tube (82) or further injection tube (76) is formed from sintered stainless steel.

8. A filling machine as claimed in any preceding claim, in which the upper surface (112) of the gassing station (18) extends horizontally.

9. A filling machine as claimed in claim 8, in which said upper surface (112) of the gassing station (18) approaches the downward stretch (110) of the guide path at a position which is above the axis (114) of the one roller (88).

10. A filling machine as claimed in any of claims 1-5, in which the upper surface (6112) of the gassing station (674) is inclined upwardly in the direction of movement of the conveyor.

11. A filling machine as claimed in any preceding claim, in which there are a plurality of lanes of containers.

12. A method of filling containers with a food product comprising the steps of moving a conveyor (40) along a substantially horizontal path, loading empty containers (42) onto the conveyor at a loading station (10), filling the containers with a food product at a filling station (16), creating, prior to sealing, an atmosphere of a desired gas in the unfilled parts of the containers at a gassing station (18), applying closures to the containers at a sealing station (20), and unloading the containers from the conveyor at an unloading station (22), the stations being arranged along the horizontal path in the order recited, in which, in the step of creating an atmosphere of a desired gas in the unfilled parts of the containers, the desired gas is injected by means of a porous injection tube (82) into a chamber (74;674) located above the conveyor between the filling and sealing stations in a state of laminar flow through the pores in the injection tube (82) which is formed from a sintered metal, the method further including the step of guiding sealing foil (84) along a guide path to the sealing station with the aid of a set of rollers (86,88), the rollers including one roller (88) located along the conveyor and upstream, in the direction of movement of the conveyor, from the sealing station (20), the guide path including a downward stretch (110) leading to the one roller (88) and the sealing foil (84) passing along the downward stretch forming a wall of the chamber of the gassing station (18) in which the upper surface (112;6112) of the wall of the gassing station (18) approaches the downward stretch of the guide path at a position which is above or at the axis (114) of rotation of the one roller (88;688).

13. A method of filling containers as claimed in claim 12, in which the desired gas is nitrogen.

14. A method of filling containers as claimed in claim 12 or claim 13, including the step of introducing a mixture of hydrogen peroxide and heated air into the empty containers in order to sterilise and dry the empty containers prior to the filling of the containers with a food product at the filling station.

15. A method of filling containers as claimed in any of claims 12-14 in which the filling station (16) includes a further injection tube (76) formed from a sintered metal and includes the step of injecting filtered air filtered by a filter sterilised by steam into the filling chamber (72).

16. A method of filling containers as claimed in any of claims 12-15, in which the upper surface (112) of the chamber (74) of the gassing station (18) extends horizontally.

17. A method of filling containers as claimed in any of claims 12-15, in which the upper surface (6112) of the chamber (674) of the gassing station (18) is inclined upwardly in the direction of movement of the conveyor (640).

18. A method of filling containers as claimed in claim 16, in which said upper surface (112) of the gassing station (18) approaches said downward stretch (110) of the guide path at a position which is above the axis (114) of said one roller (88).

19. A method of filling containers as claimed in any of claims 12-18, in which there are a plurality of lanes of containers.

20. A method of filling containers as claimed in any of claims 12 or 15 in which the injection tube (82) or further injection tube (76) is formed from sintered steel.

Patentansprüche

1. Maschine zum Füllen von Behältern mit einem Nahrungsmittel, wobei die Maschine aufweist:
einen Förderer (40) zum Transportieren von Behältern entlang eines im wesentlichen horizontalen Weges;
eine Ladestation (10) zum Laden von leeren Behältern (42) auf den Förderer;
eine Füllstation (16) zum Füllen der Behälter mit einem Nahrungsmittel;
eine Begasungsstation (18) zum Schaffen einer Atmosphäre eines gewünschten Gases in den ungefüllten Teilen des Behälters vor dem Verschließen;
eine Verschließstation (20) zum Anlegen von Verschlüssen zum Verschließen der gefüllten Behälter; und
eine Entladestation (22) zum Entladen der gefüllten und verschlossenen Behälter von dem Förderer;
wobei die Stationen entlang des horizontalen Weges in der angegebenen Reihenfolge angeordnet sind;
wobei die Begasungsstation (18) eine Begasungskammer (74), die über dem Förderer zwischen der Füll- und Verschließstation (16, 20) angeordnet ist, und ein Einspritzrohr (82) einer porösen Struktur aufweist, das aus einem gesinterten Metall gebildet ist, das in der Begasungskammer (74) zum Einspritzen des gewünschten Gases durch die Poren des Einspritzrohres (82) in die Begasungskammer (74) in einem Zustand einer laminaren Strömung angeordnet ist;
wobei die Maschine des weiteren eine Gruppe von Rollen (86, 88) zum Führen einer Verschließfolie (84) entlang eines Führungsweges zu der Verschließstation (20) aufweist, wobei die Rollen eine Rolle (88) aufweisen, die über dem Förderer und stromaufwärts in Richtung der Bewegung des Förderers von der Verschließstation (20) angeordnet sind, wobei der Führungsweg einen nach unten gerichteten Spanner (110) aufweist, der zu der einen Rolle (88) führt, wobei die Verschließfolie im Bereich des nach unten gerichteten Zuges (110) vorbeiläuft, wodurch eine Wand der Begasungskammer (74) gebildet wird; und
die Begasungskammer (74) eine obere Oberfläche (112) aufweist, die sich im Bereich des nach unten gerichteten Zuges (110) des Führungsweges an einer Position nähert, die über oder an dem Niveau der Achse (114) der einen Rolle (88) ist.

2. Füllmaschine gemäß Anspruch 1, bei der das Einspritzrohr (82) aus gesintertem Stahl gebildet ist.

3. Füllmaschine gemäß Anspruch 1 oder 2, bei der das gewünschte Gas Stickstoff ist.

4. Füllmaschine gemäß einem der vorhergehenden Ansprüche, die des weiteren eine Sterilisierstation (12) mit einer Einrichtung (46) zum Einspritzen von Wasserstoffperoxid in die leeren Behälter und eine Trocknungsstation (14) mit einer Einrichtung (54) zum Einspritzen von gefilterter erwärmter Luft in die Behälter zum Aktivieren der Sterilisierwirkung des Wasserstoffperoxids und dem Trocknen der Behälter vor dem Eintreten in die Füllstation (16) aufweist.

5. Füllmaschine gemäß Anspruch 4, bei der die Sterilisierstation (12) und die Trocknungsstation (14) zwischen der Ladestation (10) und der Füllstation (16) angeordnet sind.

6. Füllmaschine gemäß einem der vorhergehenden Ansprüche, bei der die Füllstation (16) ein weiteres Einspritzrohr (76) aufweist, das aus einem gesinterten Metall zum Einspritzen gefilterter Luft gebildet ist, die durch einen Filter gefiltert wird, der durch Dampf in der Füllkammer (72) sterilisiert ist.

7. Füllmaschine gemäß Anspruch 2 oder 6, bei der das Einspritzrohr (82) oder das weitere Einspritzrohr (76) aus gesintertem nichtrostendem Stahl gebildet ist.

8. Füllmaschine gemäß einem der vorhergehenden Ansprüche, bei der die obere Oberfläche (112) der Begasungsstation (18) sich horizontal erstreckt.

9. Füllmaschine gemäß Anspruch 8, bei der die obere Oberfläche (112) der Begasungsstation (18) sich im Bereich des nach unten gerichteten Zuges (110) des Führungsweges an einer Position nähert, die über der Achse (114) der einen Rolle (88) ist.

10. Füllmaschine gemäß einem der Ansprüche 1 bis 5, bei der die obere Oberfläche (6112) der Begasungsstation (674) nach oben in die Richtung der Bewegung des Förderers geneigt ist.

11. Füllmaschine gemäß einem der vorhergehenden Ansprüche, bei der eine Vielzahl von Behälterbahnen vorhanden ist.

12. Verfahren zum Füllen eines Behälters mit einem Nahrungsmittel, das die Schritte aufweist:
Bewegen eines Förderers (40) entlang eines im wesentlichen horizontalen Weges, Laden leerer Behälter (42) auf den Förderer an einer Ladesta-

tion (10), Füllen der Behälter mit einem Nahrungsmittel an einer Füllstation (16), Schaffen einer Atmosphäre eines gewünschten Gases in den ungefüllten Teilen der Behälter an einer Begasungsstation (18) vor dem Verschließen, Anlegen von Verschlüssen an die Behälter an einer Verschließstation (20) und Entladen der Behälter von dem Förderer an einer Entladestation (22), wobei die Stationen entlang des horizontalen Weges in der aufgeführten Reihenfolge angeordnet sind, in der in dem Schritt des Schaffens einer Atmosphäre eines gewünschten Gases in den ungefüllten Teilen der Behälter das gewünschte Gas mittels eines porösen Einspritzrohres (82) in eine Kammer (74, 674) eingespritzt wird, die über dem Förderer zwischen der Füll- und der Verschließstation in einem Zustand einer laminaren Strömung durch die Poren in dem Einspritzrohr (82) eingespritzt wird, das aus einem gesinterten Metall gebildet ist, wobei das Verfahren des weiteren den Schritt eines Führens einer Verschließfolie (84) entlang eines Führungsweges zu der Verschließstation mittels einer Gruppe von Rollen (86, 88) aufweist, wobei die Rollen eine Rolle (88) aufweisen, die entlang dem Förderer und stromaufwärts von der Verschließstation (20) in der Richtung der Bewegung des Förderers angeordnet ist, wobei der Führungsweg einen nach unten gerichteten Zugu (110) aufweist, der zu einer Rolle (88) führt, und die Verschließfolie (84) im Bereich des nach unten gerichteten Zuges vorbeiläuft, wodurch eine Wand der Kammer der Begasungsstation (18) gebildet wird, in der die obere Oberfläche (112; 6112) der Wand der Begasungsstation (18) sich im Bereich des nach unten gerichteten Zuges des Führungsweges an einer Position nähert, die über oder an der Drehachse (114) der einen Rolle (88; 688) ist.

13. Verfahren des Füllens von Behältern gemäß Anspruch 12, bei dem das gewünschte Gas Stickstoff ist.

14. Verfahren des Füllens von Behältern gemäß Anspruch 12 oder 13, das den Schritt des Einführens eines Gemisches aus Wasserstoffperoxid und erwärmter Luft in die leeren Behälter aufweist, um die leeren Behälter vor dem Füllen der Behälter mit einem Nahrungsmittel an der Füllstation zu sterilisieren und zu trocknen.

15. Verfahren des Füllens von Behältern gemäß einem der Ansprüche 12 bis 14, bei dem die Füllstation (16) ein weiteres Einspritzrohr (76) aufweist, das aus einem gesinterten Metall gebildet ist, und den Schritt des Einspritzens von gefilterter Luft aufweist, die durch einen Filter gefiltert wird, der durch Dampf in der Füllkammer (72) sterilisiert wird.

16. Verfahren des Füllens von Behältern gemäß einem der Ansprüche 12 bis 15, bei dem sich die obere Oberfläche 112 der Kammer (74) der Begasungsstation (18) horizontal erstreckt.

17. Verfahren des Füllens von Behältern gemäß einem der Ansprüche 12 bis 15, bei dem die obere Oberfläche (6112) der Kammer (674) der Begasungsstation (18) nach innen in die Richtung der Bewegung des Förderers (640) geneigt ist.

18. Verfahren des Füllens von Behältern gemäß Anspruch 16, bei dem die obere Oberfläche (112) der Begasungsstation (18) sich dem nach unten gerichteten Zug (110) des Führungsweges an einer Position nähert, die über der Achse (114) der einen Rolle (88) ist.

19. Verfahren des Füllens von Behältern gemäß einem der Ansprüche 12 bis 18, bei dem eine Vielzahl von Behälterbahnen vorhanden ist.

20. Verfahren des Füllens von Behältern gemäß einem der Ansprüche 12 oder 15, bei dem das Einspritzrohr (82) oder das weitere Einspritzrohr (76) aus gesintertem Stahl gebildet ist.

Revendications

1. Machine pour remplir des récipients d'un produit alimentaire, la machine comprenant :

un convoyeur (40) pour transporter les récipients sur un chemin sensiblement horizontal ;

un poste de chargement (10) pour charger les récipients vides (42) sur le convoyeur ;

un poste de remplissage (16) pour remplir les récipients d'un produit alimentaire ;

un poste d'introduction d'un gaz (18) pour créer une atmosphère d'un gaz souhaité dans les parties non remplies des récipients avant de les fermer ;

un poste de scellement (20) pour appliquer des fermetures de scellement des récipients remplis ; et

un poste de déchargement (22) pour décharger les récipients remplis et fermés du convoyeur ;

les postes étant disposés sur le chemin horizontal dans l'ordre indiqué ;

le poste d'introduction d'un gaz (18) comprenant une chambre à gaz (74) placée au-dessus du convoyeur entre les postes de remplissage et de scellement (16, 20), et un tube d'injection (82) de structure poreuse construit en un métal fritté situé dans la chambre à gaz (74) pour in-

jecter le gaz désiré à travers les pores du tube d'injection (82) dans la chambre à gaz (74) à l'état d'écoulement laminaire ;

la machine comprenant en outre un jeu de galets (86, 88) pour guider la feuille de scellement (84) le long d'un chemin de guidage vers le poste de scellement (20), les galets comprenant un galet (88) situé au-dessus du convoyeur et en amont, dans la direction du mouvement du convoyeur, à partir du poste de scellement (20), le chemin de guidage comprenant un allongement descendant (110) conduisant audit galet (88), la feuille de scellement passant le long de l'allongement descendant (110) constituant une paroi de la chambre à gaz (74) ; et

la chambre à gaz (74) ayant une surface (112) qui s'approche de l'allongement descendant (110) du chemin de guidage en une position qui est située au-dessus ou au niveau de l'axe (114) dudit galet (88).

2. Machine de remplissage selon la revendication 1, dans laquelle le tube d'injection (82) est construit en acier fritté.

3. Machine de remplissage selon la revendication 1 ou 2, dans laquelle le gaz souhaité est l'azote.

4. Machine de remplissage selon l'une quelconque des revendications précédentes, comprenant en outre un poste de stérilisation (12) comportant un moyen (46) pour injecter du peroxyde d'hydrogène dans les récipients vides, et un poste de séchage (14) comprenant un moyen (54) pour injecter de l'air chauffé, filtré, dans les récipients afin d'activer l'action de stérilisation du peroxyde d'hydrogène et de sécher les récipients avant qu'ils arrivent au poste de remplissage (16).

5. Machine de remplissage selon la revendication 4, dans laquelle le poste de stérilisation (12) et le poste de séchage (14) sont installés entre le poste de chargement (10) et le poste de remplissage (16).

6. Machine de remplissage selon l'une quelconque des revendications précédentes, dans laquelle le poste de remplissage (16) comprend un autre tube d'injection (76) fabriqué en métal fritté pour injecter de l'air filtré par un filtre stérilisé au moyen de la vapeur dans la chambre de remplissage (72).

7. Machine de remplissage selon l'une quelconque des revendications 2 ou 6, dans laquelle le tube d'injection (82) ou l'autre tube d'injection (76) est construit en acier inoxydable fritté.

8. Machine de remplissage selon l'une quelconque des revendications précédentes, dans laquelle la surface supérieure (112) du poste d'introduction du gaz (18) est orientée horizontalement.

9. Machine de remplissage selon la revendication 8, dans laquelle ladite surface supérieure (112) du poste de remplissage en gaz (18) s'approche de l'allongement descendant (110) du chemin de guidage en une position qui est située au-dessus de l'axe (114) dudit galet (88).

10. Machine de remplissage selon l'une quelconque des revendications 1 à 5, dans laquelle la surface supérieure (6112) du poste de remplissage en gaz (674) est inclinée vers le haut, dans la direction du mouvement du convoyeur.

11. Machine de remplissage selon l'une quelconque des revendications précédentes, dans laquelle il y a plusieurs files de récipient.

12. Procédé pour remplir des récipients d'un produit alimentaire, comprenant les étapes de déplacement d'un convoyeur (40) le long d'un chemin sensiblement horizontal, de chargement des récipients vides (42) sur le convoyeur en un poste de chargement (10), de remplissage des récipients avec un produit alimentaire en un poste de remplissage (16), de créer, avant le scellement, une atmosphère d'un gaz souhaité dans les parties non remplies des récipients au poste de remplissage en gaz (18), d'application de fermetures sur les récipients en un poste de scellement (20) et de déchargement des récipients du convoyeur en un poste de déchargement (22), les postes étant disposés le long d'un chemin horizontal dans l'ordre indiqué, dans lequel, au cours de l'opération de création d'une atmosphère d'un gaz souhaité dans les parties non remplies des récipients, le gaz souhaité est injecté au moyen d'un tube d'injection poreux (82) dans une chambre (74 ; 674) située au-dessus du convoyeur entre les postes de remplissage et de scellement dans un état d'écoulement laminaire à travers les pores du tube d'injection (82) qui est construit en un métal fritté, le procédé comprenant en outre l'opération de guidage d'une feuille de scellement (84) le long d'un chemin de guidage vers le poste de scellement au moyen d'un jeu de galets (86, 88), les galets comprenant un galet (88) situé le long du convoyeur et en amont, dans la direction du mouvement du convoyeur, à partir du poste de scellement (20), le chemin de guidage comprenant un allongement descendant (110) partant dudit premier galet (88) et la feuille de scellement (84) passant le long de l'allongement descendant en formant une paroi de la chambre du poste de

remplissage en gaz (18) dans laquelle la surface supérieure (112 ; 6112) de la paroi du poste de remplissage en gaz (18) s'approche de l'allongement descendant du chemin de guidage en une position qui se trouve au-dessus ou sur l'axe (114) de rotation dudit galet (88 ; 688).

13. Procédé de remplissage de récipients selon la revendication 12, dans lequel le gaz souhaité est de l'azote.

14. Procédé de remplissage de récipients selon la revendication 12 ou 13, comprenant l'opération d'introduction d'un mélange de peroxyde d'hydrogène et d'air chauffé dans les récipients vides, afin de les stériliser et de sécher les récipients vides avant de les remplir d'un produit alimentaire au poste de remplissage.

15. Procédé de remplissage de récipients, selon l'une quelconque des revendications 12 à 14, dans lequel le poste de remplissage (16) comprend un autre tube d'injection (76) fabriqué en un métal fritté et comprend en outre l'opération d'injection d'air filtré par un filtre stérilisé à la vapeur dans la chambre de remplissage (72).

16. Procédé de remplissage de récipients, selon l'une quelconque des revendications 12 à 15, dans lequel la surface supérieure (112) de la chambre (74) du poste de remplissage en gaz (18) est orientée horizontalement.

17. Procédé de remplissage de récipients, selon l'une quelconque des revendications 12 à 15, dans lequel la surface supérieure (6112) de la chambre (674) du poste de remplissage en gaz (18) est inclinée vers le haut dans la direction du mouvement du convoyeur (640).

18. Procédé de remplissage de récipients, selon la revendication 16, dans lequel ladite surface supérieure (112) du poste de remplissage en gaz (18) s'approche dudit allongement descendant (110) du chemin de guidage en une position située au-dessus de l'axe (114) dudit galet (88).

19. Procédé de remplissage de récipients selon l'une quelconque des revendications 12 à 18, dans lequel il existe plusieurs files de récipients.

20. Procédé de remplissage de récipients selon l'une quelconque des revendications 12 ou 15, dans lequel le tube d'injection (82) ou l'autre tube d'injection (76) est construit en acier fritté.

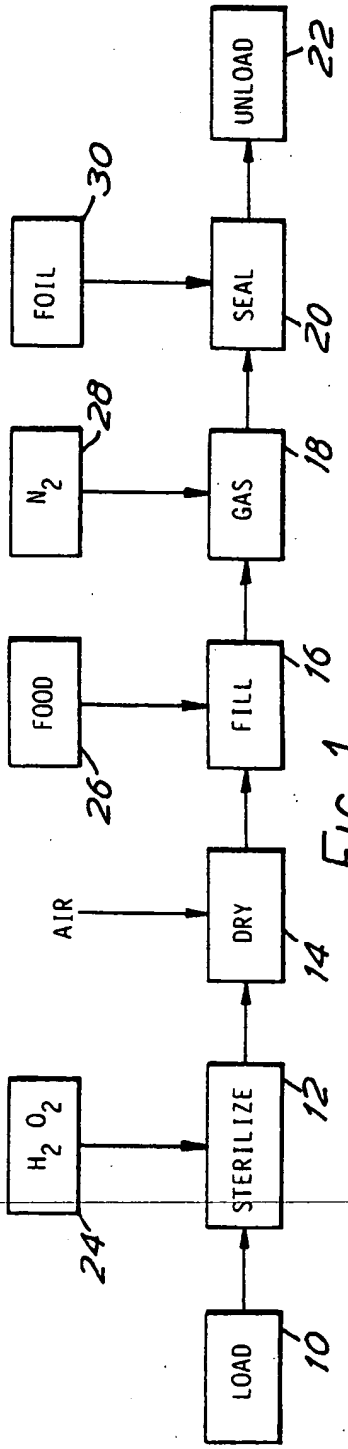

LOAD
10
STERILIZE
12
H_2O_2
24
DRY
14
AIR
FILL
16
FOOD
26
GAS
18
N_2
28
SEAL
20
FOIL
30
UNLOAD
22

FIG. 1

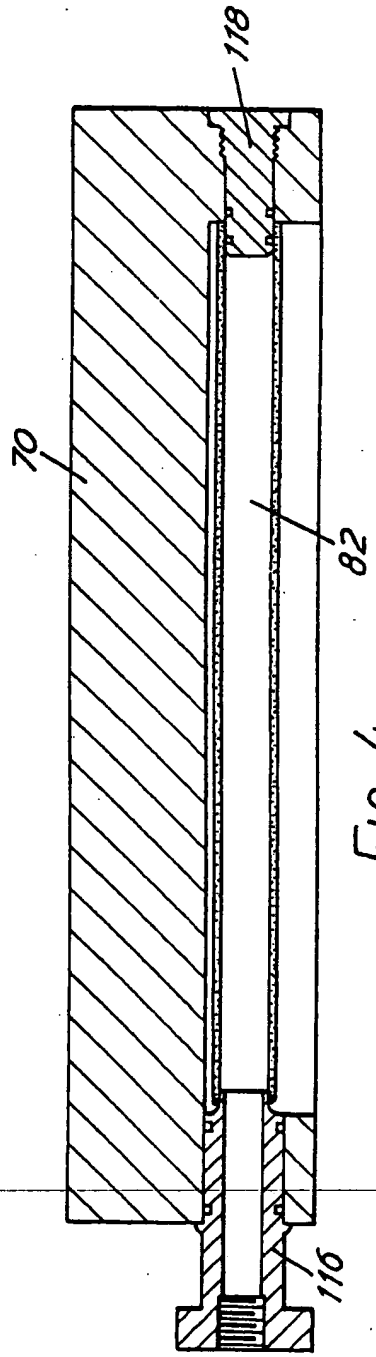
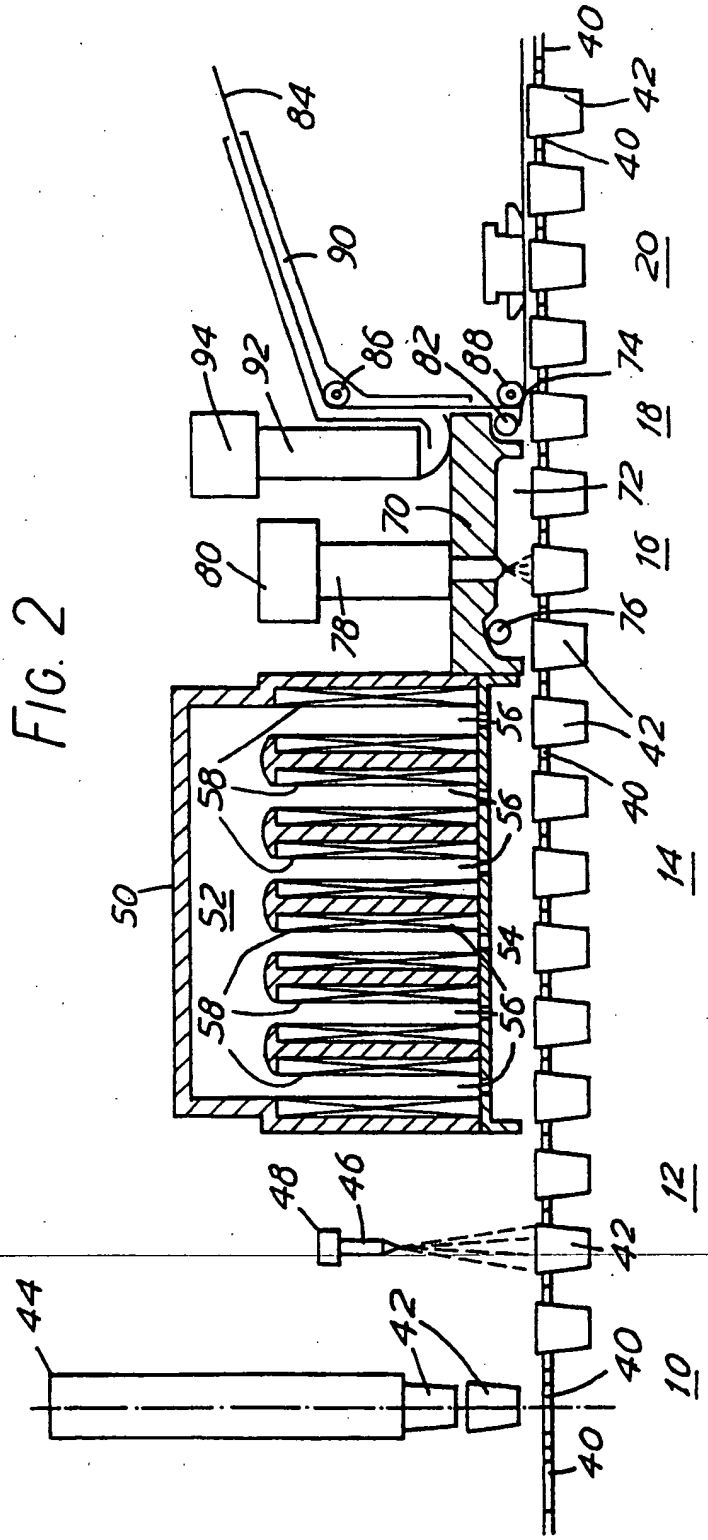

118
70
82
116

FIG. 4

FIG. 2


40
42
84
90
20
94
92
86
82
88
74
18
72
70
16
80
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76
56
58
42
14
50
52
54
48
46
12
44
10

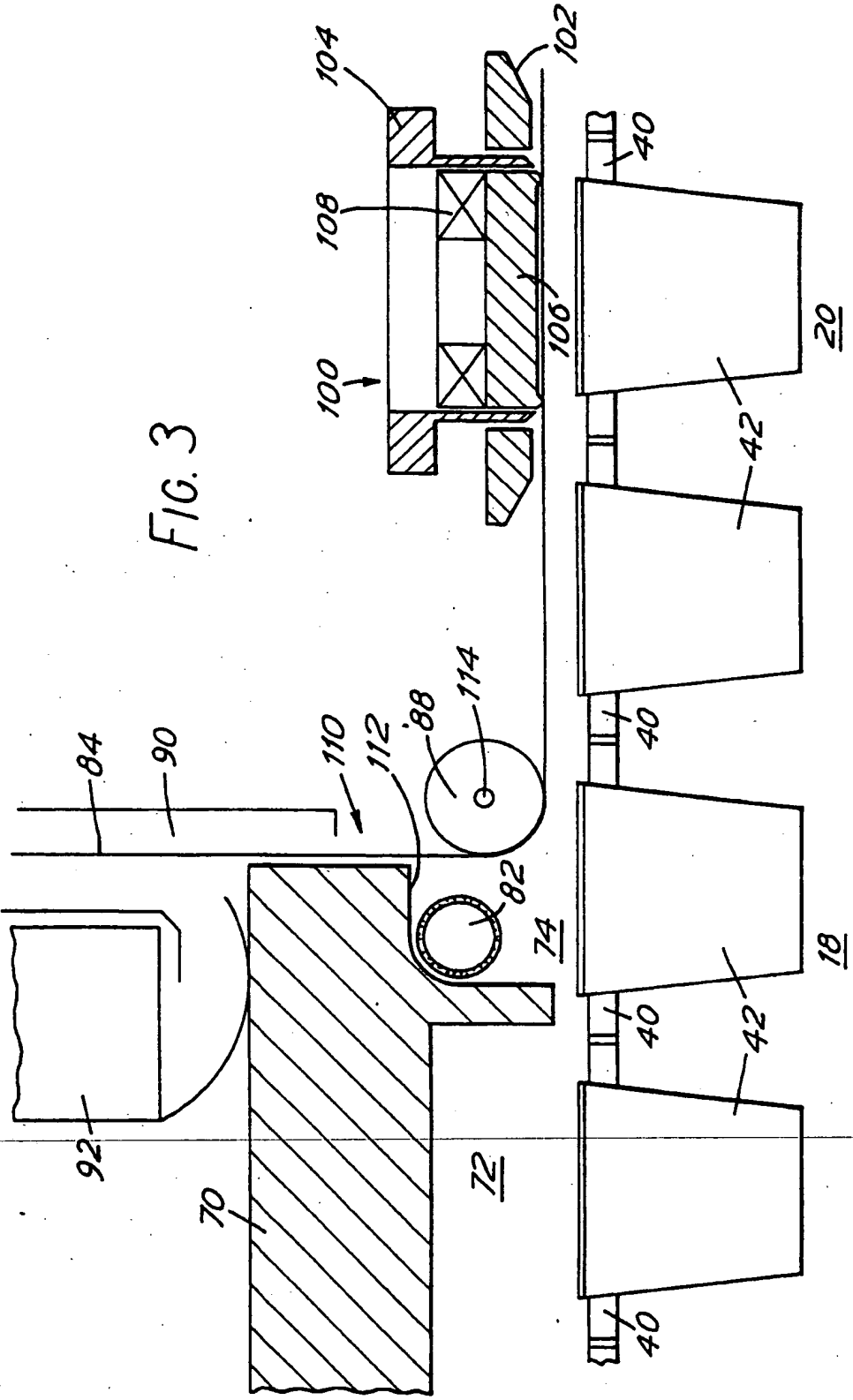

104
102
108
106
100
40
20
42
40
84
90
110
112
88
114
82
74
18
40
42
92
72
70
40

FIG. 3

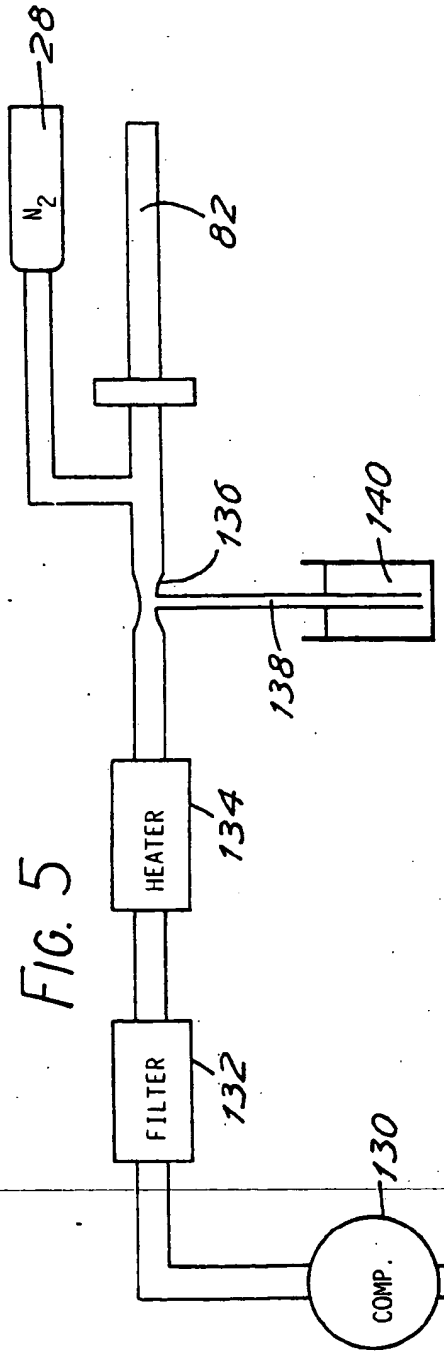

28
N_2
82
130
140
138
134
HEATER
132
FILTER
130
COMP.
AIR

FIG. 5

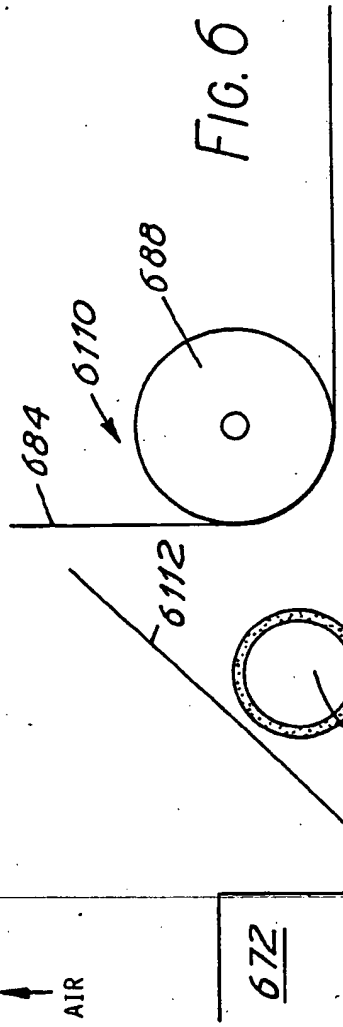
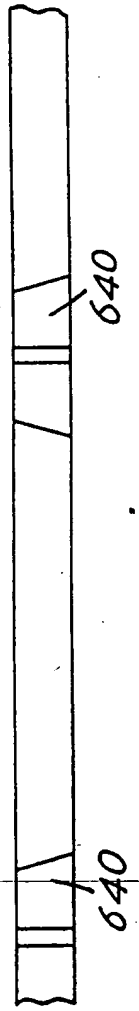

6110
688
684
6112
674
682
672

FIG. 6


640
640

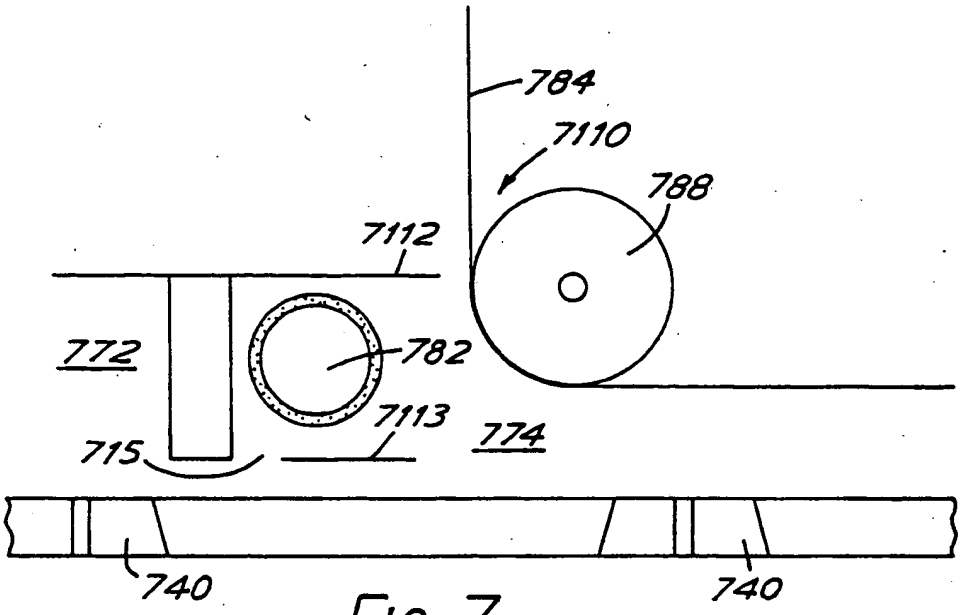

784
7110
788
7112
772
782
7113
774
715
740
740

FIG. 7

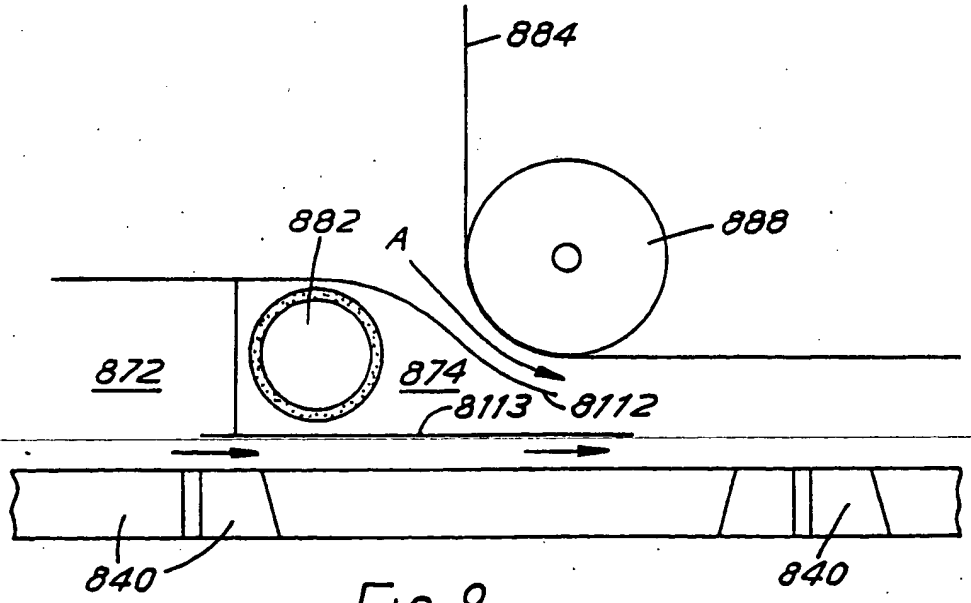

884
882
A
888
872
874
8113
8112
840
840

FIG. 8